**MODULE: 8: NETWORK ACCESS ROUTING**

1. **Explain Switch**

* **Definition**: A switch is a networking device that connects multiple devices within a LAN (Local Area Network).
* **Function**: It forwards data only to the device(s) that need it, based on MAC addresses.
* **Layer**: Operates at the **Data Link Layer (Layer 2)** of the OSI model (some advanced switches also operate at Layer 3).
* **MAC Address Table**: Maintains a table to track which devices (MAC addresses) are connected to which ports.
* **Efficiency**: Reduces network congestion by sending data only where it's needed, unlike a hub, which broadcasts to all devices.
* **Full-Duplex Support**: Allows simultaneous sending and receiving of data, increasing speed.
* **Security**: Offers better security than hubs because data is not broadcast to all devices.
* **Types**: Managed (configurable) and unmanaged (plug-and-play) switches are commonly used.

**2. Explain Switch Boot Sequence**

* **Power On**

🡪 When you turn on the switch, it starts up.

* **POST (Power-On Self Test)**

🡪 The switch checks if all parts (like memory and ports) are working properly.

* **Boot Loader Starts**

🡪A small program (boot loader) helps the switch start up.

* **Loading the IOS**

🡪The switch loads its main software (called IOS) from memory so it can work.

* **Loading the Configuration**

🡪The switch looks for saved settings (like IP address, VLAN info).

🡪If it finds them, it loads them.

🡪If not, it asks you to set them up.

* **Ready to Use**

🡪 Now the switch is fully started and ready to connect and manage devices.

**3. Explain Three Methods to access the Switch Command Line Interface**

**I. Console Cable (Direct Access)**

* How: Connect your PC to the switch using a console cable (usually RJ-45 to USB or serial).
* Tool Needed: Use terminal software (like PuTTY, Tera Term, or HyperTerminal).
* Use: Common for initial setup when the switch has no network settings.

**ii. Telnet**

* How: Connect to the switch over the network using an IP address.
* Command Example: telnet 192.168.1.1
* Note: Telnet is not secure (sends data as plain text).

**iii. SSH (Secure Shell)**

* How: Similar to Telnet, but secure and encrypted.
* Command Example: ssh admin@192.168.1.1
* Use: Recommended for remote CLI access over the network.

**4. Explain and configure the Cisco Internet Operating System .**

* Cisco IOS is the operating system used in Cisco switches and routers.
* It is command-line based (CLI) – you type commands to manage the device.
* To configure IOS, you use different modes:
* User mode – basic access
* Privileged EXEC mode – advanced commands (enable)
* Global config mode – system-wide settings (configure terminal)
* Basic Setup Includes:
* Changing hostname
* Setting console and enable passwords
* Assigning IP address to VLAN 1 (for switch access)
* Setting a default gateway (for remote management)
* Saving the configuration
* Commands are case-insensitive but must be typed correctly.
* Use the copy running-config startup-config to save settings permanently.
* Use show commands (like show Ip interface brief) to view settings.

**5. Explain Switch Port**

* A place to connect devices (like computers and printers).
* Access port – connects to one device.
* The trunk port connects to another switch and carries many VLANs.
* Learns device MAC addresses to send data correctly.
* Can set speed (fast or slow) and duplex (one-way or two-way).
* Use commands to check if the port is working.
* It can add security to stop unknown devices.
* Each port can be in a VLAN (a small network).
* Use shutdown to turn off a port, no shutdown to turn it on.
* Port lights (LEDs) show if it's connected and active.

**6 . R1, R2, R3, and R4 have their Fast Ethernet 0/0 interfaces attached to the same VLAN. A network engineer has typed a configuration for each router by using a word processor. He will later copy and paste the configuration into the routers. Examine the following exhibit, which lists configuration for the four routers, as typed by the network engineer. Assuming that all four routers can ping each other’s LAN IP addresses after the configuration has been applied, choose the routers that will be able to form a neighbor relationship with the other routers on the LAN. (You can assume that, if not shown in the exhibit, all other related parameters are still set to their defaults.) (Choose two)**

* A & B (R1,R2)

**7. Enable secret [password] to be hashed using the algorithm.**

**🡺** A. MD5

**8. An engineer connects to Router R1 and issues a show Ip ospf neighbour command. The status of neighbour 2.2.2.2 lists FULL/BDR. What does the BDR mean?**

**🡺**D. Router 2.2.2.2 is a backup designated router.

**9. Which command is used to view the neighbor discovery table on a PC?**

**🡺** C. netsh interface ipv6 show neighbors

**10. What type of variable is being shown? Routers = [R1,R2,R3]**

🡺 A. List

**11. Identify the fields in an IPv4 header. (Choose three)**

🡺 B. Time to Live

C. Source address

D. Destination address